ALTERNATIVE LEACHATE/GROUNDWATER TREATMENT PILOT STUDY WORK PLAN

KIN-BUC LANDFILL, EDISON TOWNSHIP MIDDLESEX COUNTY, NEW JERSEY

Prepared for:

SCA Services, Inc.
c/o Waste Management, Inc.
Hampton, New Hampshire

January 23, 2001

Prepared by:

IT Corporation
One International Boulevard, Suite 700
Mahwah, New Jersey 07495

and

MWO Environmental Engineering & Consulting, P.C.
17 Maple Lane P.O. Box 569
Monroe, New York 10950

IT Project 86601-001.000

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1 INTRODUCTION

In July 1998, a leachate treatment facility (LTF) performance study commenced at the Kin-Buc Landfill. The LTF had been operating since July 1995, in compliance with the effluent limits contained in the New Jersey Pollutant Discharge Elimination System (NJPDES) permit equivalency issued in 1992.

Through an initial and 8 subsequent rounds of influent and process sampling, it was discovered that the influent leachate/groundwater quality changed significantly compared to the original 1992-1993 design conditions. Influent concentrations of most parameters were at least one order of magnitude lower than the original design conditions and the 9 rounds of sampling indicated a consistent pattern of reduction. This led to laboratory treatability studies, performed from January to October 2000, which showed that that physical/chemical treatment, specifically metals precipitation, air stripping and granular activate carbon (GAC) treatment would provide a viable, economical alternative to the existing LTF (metals precipitation, 2-stage powdered activated carbon treatment (PACT) and rapid sand filtration). The treatability studies also showed that liquid caustic and 5 ppm of a cationic polymer at pH 9.5 would be effective for use in the metals removal process in place of lime. Because of their easier handling requirements compared to lime, caustic and polymer will be evaluated in the pilot study.

A full-scale field pilot study was recommended to confirm the viability of alternative physical/chemical treatment. This Work Plan states the pilot study objectives and describes the pilot process configuration, operation, and monitoring. It also describes the report that will document the study.

Other activities during 2000 included revision of the NJPDES permit equivalency effluent limits in October 2000, in anticipation of implementing alternative physical/chemical treatment, and obtaining a permit to discharge to the Middlesex County Utilities Authority (MCUA) in December 2000. Discharge to MCUA presents significant advantages over discharge to surface water because there are no BOD_5, ammonia, or toxicity effluent limits. Therefore, this work plan was developed assuming discharge to MCUA.

Prior to full-scale implementation of alternative treatment and discharge to MCUA, a new outfall line to MCUA's meter chamber, approximately 2,000 feet from the LTF, needs to be constructed. A conceptual design and preliminary cost estimate for this outfall line have been prepared. Approval to discharge to MCUA's Mill Brook meter chamber needs to be obtained from Edison Township, as it has jurisdiction over the local wastewater collection system. According to MCUA, the meter chamber is not operational because it has not been used for many years. The nature of improvements required is not known. The nature and cost of improvements needs to be resolved with Edison Township as soon as possible to identify additional costs associated with the outfall line.

This work plan will be submitted to the U.S. Environmental Protection Agency (EPA) and the New Jersey Department of Environmental Protection (NJDEP), prior to implementation, to provide them details on the proposed pilot study.

2 PILOT STUDY OBJECTIVES

The overall objective of the pilot study is to provide evidence that alternative physical/chemical treatment, indicated to be viable in the laboratory treatability studies, can consistently meet effluent limits on site on a full-scale basis. If the pilot study demonstrates this, alternative physical/chemical treatment can be implemented and PACT and rapid sand filtration would no longer be needed.

Effluent Limit Compliance

On December 5, 2000, the MCUA issued a discharge permit to SC Holdings, Inc. This resulted after submission, in June 2000, of an application for a discharge permit which described the changed influent quality conditions at Kin-Buc. The major advantages of discharging to MCUA, instead of existing surface water discharge, are no BOD_5, ammonia, and acute toxicity effluent limits. Therefore, discharge to MCUA is preferred to surface water discharge. Table 2-1 shows the surface water discharge limits for comparison with the MCUA pretreatment limits.

Tables 2-2 through 2-2c show the MCUA pretreatment limits. Tables 2-2a, 2-2b, and 2-2c provide the Total Volatile Organic Substances (TVOS), Total Toxic Organic (TTO), and individual Pesticide and PCB parameters and limits, respectively, that are part of the MCUA pretreatment limits.

Other Objectives

In addition to evaluating the ability to meet effluent limits, the following are also objectives of the pilot study:

- To provide documentation of the efficacy of alternative treatment; such documentation will be required for obtaining approval to implement alternative treatment from NJDEP or MCUA.
- To evaluate the effectiveness of liquid caustic and polymer for metals precipitation in place of lime, including iron removal efficiency and sludge settleability, compaction, and dewaterability.
- To observe operating conditions; specifically:
    - GAC unit pressure drop (related to backwashing frequency in full-scale system).
    - GAC consumption before replacement.
    - Hardness fouling of the air stripper or GAC unit, the frequency of which may suggest ancillary treatment in the form of chemical addition (e.g., sodium hexametaphosphate) or in-line magnetic resonance devices.

3 PILOT PROCESS CONFIGURATION

3.1 Overall Scheme

The existing leachate and groundwater equalization tanks will be utilized. The existing metals precipitation system will also be utilized; however, provisions for addition of liquid caustic will be provided so that the use of caustic can be evaluated during the pilot study. The existing polymer feed equipment, currently not used, will be utilized. The intent is to send the full plant flow through the pilot equipment for a period of 6 months.

After the existing neutralization tank, flow will be diverted to a diffused bubble air stripper. For the pilot study, one stripper will be utilized. For full-scale implementation, one or two more strippers would be added. The additional stripper(s) would provide backup capability, capacity to treat Edison Landfill's leachate, and operational flexibility, should the influent characteristics change significantly. For example, the strippers could be operated in series if influent volatile organic compound (VOC) concentrations increased and additional treatment was required.

Flow will then be sent to a granular activated carbon (GAC) unit. For the pilot study, one unit will be utilized. For full-scale implementation, two GAC units would be utilized and operated in series. Dual GAC treatment is utilized when there is a potential or actual need for PCB removal. Sampling between GAC units provides early warning of GAC exhaustion so that GAC can be changed out and the effluent limits can be met. The full-scale units would also be capable of being backwashed.

After GAC treatment, effluent will be sent to the existing PACT system and rapid sand filter. Therefore, during the pilot study, all leachate/groundwater will be treated in the existing LTF prior to discharge to the Raritan River. The pilot processes will simply be located between the existing metals removal and PACT processes.

Figure 3-1 provides a schematic drawing of the pilot equipment location with respect to the existing LTF.

3.2 Equipment Selection

Air stripper and GAC unit selection is made on the basis of influent flow rate, influent quality, and required effluent quality.

3.2.1 Leachate/Groundwater Flow Rate

Kin-Buc's existing leachate/groundwater collection rate is approximately 15,000 to 20,000 gallons per day (gpd). Leachate from the Edison Landfill, which is expected to be generated in approximately two years, would add 25,000 to 30,000 gpd initially, with a

decrease expected several years thereafter, according to Mr. Brian Gillen of Converse Consultants (see Appendix A). Therefore, a maximum flow of 40,000 to 50,000 gpd would have to be handled in approximately two years. Because air strippers and GAC systems are modular in nature, i.e., additional capacity can be readily added, it is proposed that the pilot air stripper and GAC unit be sized for Kin-Buc's flow of 20,000 gpd. Building in capacity for Edison Township's initial flow would not be prudent until it is clear that discharge will be to MCUA, that agreement will be reached with Edison Township to handle their leachate. Edison Township's future collection system design may also result in revised flow rates and influent quality.

3.2.2 Estimated Treatment Requirements

Table 3-1 shows the estimated treatment requirements for discharge to surface water. Based on conservative estimates of influent quality and the NJPDES permit equivalency effluent limits, it shows that removal of total suspended solids (TSS), ammonia, several volatile organic compounds (VOCs), several semi-volatile organic compounds (SVOCs), and copper and lead will be required.

Table 3-2 shows the estimated treatment requirements for discharge to MCUA. Based on conservative estimates of influent quality and the MCUA pretreatment limits, it shows that removal of nickel and TTO constituents will be required.

3.2.3 Air Stripper Selection

A diffused bubble type air stripper is recommended. While the metals precipitation process will removal significant amounts of soluble iron, which fouls air strippers, the leachate/groundwater contains significant levels of hardness and soluble calcium and magnesium after metals precipitation. Therefore, there is potential for hardness fouling of the air stripper. The diffused bubble type stripper is much less sensitive to such fouling compared to shallow tray systems, which are also commonly used. Diffused bubble strippers are more energy intensive compared to a shallow tray strippers, because the coarse bubbles result in less efficient oxygen transfer, but cleaning is much less frequent and easier.

For discharge to surface water, the VOC effluent limits in Table 3-1 are in the tens to hundreds of ug/l. For discharge to MCUA, no individual VOC removal is required for TVOS constituents and only around 50 percent removal of volatile TTO constituents is required for discharge to MCUA. However, since GAC will follow the stripper, the stripper will be sized to produce <5 ug/l of each VOC. This will prevent expensive GAC consumption by unstripped VOCs.

Figure 3-2 shows a typical diffused bubble stripper. This type of stripper is very compact. Flow through the stripper is by gravity. The final sizing and configuration of

the stripper will be based on manufacturer's recommendations after review of the treatment performance requirements shown in Table 3-3.

A spare set of internal aerators (which are inexpensive) should also be purchased. As fouling occurs, the blower pressure increases. When the blower pressure increases to a certain point, the aerators should be removed and the spare aerators inserted, which is an easy operation. Scale on the fouled aerators typically flakes off after drying; if not, mild acid cleaning is required. Having the spare set of aerators would minimize downtime.

The stripper portion of Table 3-3 also shows the estimated VOC air emissions. Because these mass emissions are less than 0.1 pounds per hour each, no air pollution control equipment will be required (reference: N.J.A.C. 7:27-17 and 7:27-17.9). However, confirmation of this will be sought from NJDEP prior to construction of the pilot system.

Provisions will have to be made for venting the exhaust stack outside the building, providing power for the stripper (blower - 230/460 volts, 1-phase or 3-phase, local control panel, effluent pump) and influent and effluent sampling ports.

3.2.4 GAC Unit Selection

Because a relatively small size GAC unit is expected to be required, a permanent type unit, capable of being backwashed, will not be used for the pilot study. An empty bed contact time of 15 minutes is typically selected when PCBs are present or potentially present. At 20,000 gpd flow (14 gpm), a GAC unit empty bed volume of approximately 210 gallons (28 cu. ft.) would be utilized. Assuming 3,000 bed volumes can be treated before unacceptable head loss develops (based on the treatability studies), a unit would last approximately 30 days (at 20,000 gpd flow). This would eliminate the need for piping plant water to the unit for backwashing and returning backwash water to the equalization tanks during the pilot study.

The final unit selection will be based on manufacturer's recommendations after review of the treatment performance requirements shown in Table 3-3.

Provisions will have to be made for an effluent sampling port.

3.2.5 Provision of Liquid Caustic

Liquid caustic will be stored in and fed from totes in the lime/chemical storage area. A caustic metering pump will also need to be provided so that the existing lime slurry metering pump can be used if a switch back to lime is required.

Based on the titration curve prepared as part of the treatability studies, approximately 2 gallons per hour (gph) of a 30 percent caustic solution will be required to raise the pH to

pH 9.5 from pH 7 at 20,000 gpd (14 gpm). Use of a typical metering pump for caustic service, capable of 0 to 3 gph, suggests use of at least a 30 percent caustic solution.

3.3 Conveyance

The conveyance (piping and pumping) requirements will include:

- gravity flow from the elevated metals removal neutralization tank to the stripper.
- pumping of stripper effluent through the GAC unit.
- pumping of GAC unit effluent to the PACT system (using the existing metals removal pumps if possible).
- provision to bypass the pilot equipment.

Conveyance details will be finalized when the pilot equipment location is finalized.

3.4 Integration With the Existing LTF Operation

The intention is to send the full plant flow through the pilot equipment on a continuous basis for a period of 6 months. There will be times when flow will need to be diverted around the pilot equipment (e.g., when changing the GAC unit, when maintaining the stripper and blower).

The existing LTF is operated and controlled using a supervisory control and data acquisition (SCADA) system. The intent is not to integrate the pilot operation into the SCADA system, which would probably require reprogramming. Local control of the pilot system will be employed; however, for continuous pilot operation, there will have to be some control interface with the existing LTF. This will be finalized during an on-site meeting and discussion of this issue with USFilter Operating Services, Inc., who will operate the pilot system.

3.5 Pilot Equipment Location

In previous discussions with Waste Management, the garage was identified as a convenient location for the pilot equipment. However, the final location should be based on consideration of wastewater conveyance (piping and pumping) and integration with the existing LTF. Therefore, the pilot equipment location should be finalized during an on-site meeting and discussion of this issue with USFilter Operating Services, Inc., who will operate the pilot system.

4 PILOT STUDY MONITORING

The pilot equipment will receive full plant flow on a continuous basis for a period of 6 months. The pilot system will be operated by USFilter Operating Services, Inc.

4.1 Regular Operations Monitoring

Pilot operating information to be collected on a daily basis includes:

- Date
- Hours of Operation
- Flow Rate
- Stripper Blower Pressure (in. H_2O)
- GAC Pressure (inlet and outlet)
- Liquid caustic usage

In addition, a record of maintenance activities will be kept, e.g., stripper/blower maintenance, stripper aerator cleaning, GAC replacement.

4.2 Influent and Effluent Monitoring

Influent and effluent monitoring will be performed after startup, as follows:

- Sampling of stripper influent for the parameters in Table 3-2
- Sampling of the stripper effluent for the VOC parameters in Table 3-2
- Sampling of GAC effluent for the parameters in Table 3-2

Sampling will be performed twice during the first two months of operation and once per month for the remaining 4 months. Parameters included for initial pilot monitoring (see Tables 3-2a and 3-3b) may be eliminated if not detected in the two initial sampling rounds conducted during the fist month.

4.3 Metals Removal Sludge Monitoring

With the use of caustic and polymer in place of lime, observations of metals removal sludge settleability and dewaterability, using the existing storage/thickening tanks and dewatering facilities, will be made.

During each dewatering run, a sample will be analyzed for:

- Percent total solids of the clarifier underflow.
- Percent total solids of the thickened sludge (filter press feed).

- Percent total solids of the filter press cake.
- Total suspended solids of the filter press filtrate.

In addition, a PCB and Toxicity Characteristic Leaching Procedure (TCLP) analysis will be performed on the sludge cake twice during the pilot study to determine the impact of caustic usage on the sludge characteristics related to disposal requirements.

4.4 Stripper VOC Emission Estimates

Estimates of VOC mass air emissions from the stripper will be performed for comparison to the 0.1 pound per hour per VOC limit before control is required. This will be done using the stripper water flow rate and water influent and effluent VOC concentrations for the stripper parameters shown in Table 3-3. As discussed in Section 3.2.3, VOC emissions are expected to be well below the 0.1 pound per hour limit.

As data becomes available, it will be reviewed. As problem areas are identified as a result of this review, recommendations for modifying the pilot operation will be made.

5 REPORT

A report will be prepared to document the pilot study. It will contain detailed information on the pilot equipment used, operating conditions, and operating results. The report will also contain recommendations for full-scale implementation of alternative treatment.

The pilot study report will serve as documentation of the efficacy of alternative treatment that will need to be presented to MCUA or USEPA and NJDEP prior to implementing alternative treatment on a full-scale basis.

TABLES

TABLE 2-1
KIN-BUC LANDFILL PILOT STUDY WORK PLAN
NJPDES Permit Equivalency Effluent Limits

Parameter	Units	Test Frequency	Sample Type	EPA Test Method[a]	Effluent Limits	
					Monthly Avg.	Daily Max.
Flow	MGD	Continuous	F	NA	NA	0.04
pH Range	S.U.	Weekly	G	NS (150.1)	NA	6.0-9.0
Petroleum Hydrocarbons	mg/l	2/Month	G	NS (418.1)	10	15
COD	mg/l	2/Month	C	NS (410.4)	NL	NL[b]
BOD_5	mg/l	Weekly	G	NS (405.1)	56	220
TSS	mg/l	Weekly	C	NS (160.2)	30	45[c]
D.O.	mg/l	Weekly	G	NS (360.2)	NL	4.0-5.0[b]
Benzene	ug/l	2/month	G	NS (624)	57	134
Chlorobenzene	ug/l	2/Month	G	NS (624)	142	380
1,1-Dichloroethane	ug/l	2/Month	G	NS (624)	22	59
Ethylbenzene	ug/l	2/Month	G	NS (624)	142	380
Tetrachloroethylene	ug/l	2/Month	G	NS (624)	52	164
Toluene	ug/l	2/Month	G	NS (624)	28	74
1,2-trans-Dichloroethylene	ug/l	2/Month	G	NS (624)	25	60
Trichloroethylene	ug/l	2/Month	G	NS (624)	26	69
Vinly Chloride	ug/l	2/Month	G	NS (624)	52.8	106
Acenaphthylene	ug/l	Monthly	G	610	1.72	3.43
Benzo(a)Anthracene	ug/l	Monthly	G	610	1.72	3.43
Benzo(a)Pyrene	ug/l	Monthly	G	610	1.72	3.43
Benzo(ghi)Perylene	ug/l	Monthly	G	610	1.72	3.43
Benzo(k)Fluoranthene	ug/l	Monthly	G	610	1.72	3.43
Ideno(1,2,3-cd)Pyrene	ug/l	Monthly	G	610	1.72	3.43
Phenanthrene	ug/l	Weekly	G	625	NL	3.5/5.4[d]
Aldrin	ug/l	Monthly	G	NS (608)	0.0875	0.176
4,4-DDT	ug/l	Weekly	G	608	0.38	0.765
PCB-1242	ug/l	Weekly	G	608	NL	0.313
PCB-1248	ug/l	Weekly	G	608	NL	0.313
PCB-1254	ug/l	Weekly	G	608	NL	0.313
PCB-1260	ug/l	Weekly	G	608	NL	0.313

TABLE 2-1
KIN-BUC LANDFILL PILOT STUDY WORK PLAN
NJPDES Permit Equivalency Effluent Limits

Parameter	Units	Test Frequency	Sample Type	EPA Test Method[a]	Effluent Limits	
					Monthly Avg.	Daily Max.
Arsenic	ug/l	Weekly	C	NS (206.2)	85.8	172
Cadmium	ug/l	Weekly	C	NS (200.7)	48.2	112
Chromium	ug/l	Weekly	C	NS (200.7)	198	396
Copper	ug/l	Weekly	C	200.8	NL	10
Lead	ug/l	Weekly	C	200.8	NL	10
Nickel	ug/l	Weekly	C	NS (200.7)	924	1,850
Zinc	ug/l	Weekly	C	NS (200.7)	1,170	2,350
Cyanide	ug/l	Weekly	C	NS (335.2)	13.2	26.4
Aluminum	ug/l	Weekly	C	NS (200.7)	9,240	18,500
Iron	ug/l	Weekly	C	NS (200.7)	532,000	1,070,000
Acute Toxicity (LC50)	TU_a'	Monthly	C	NJAC 7:18-6[e]	>50% min.[f]	NA

Notes:

a - NS - not specified in Permit and method in parentheses is used; other methods are specified in Permit.

b - COD not limited only if D.O. is an instantaneous minimum of 4 mg/l, and 5 mg/l over 24 hours.

c - 7-day average.

d - shall meet the Discharge Reporting Level of 5.4 ug/l.

e - test species/test duration are Mysid (mysidopsis bahia)/96 hour.

f - this limitation is equivalent to 2TU_a's (active toxicity units) maximum.

NA - not applicable

NS - analytical method not specified

F - flowmeter

G - grab sample

C - composite sample

TABLE 2-2
KIN-BUC LANDFILL PILOT STUDY WORK PLAN
MCUA Pretreatment Limits

Parameter	Units	Test Frequency	Sample Type	EPA Test Method[a]	Effluent Limits	
					Monthly Avg.	Daily Max.
Flow	MGD	Monthly	F	N/A	NL[f]	NL[f]
pH Range	S.U.	Weekly	G	NS (150.1)	NA	5.0-10.0
Petroleum Hydrocarbons	mg/l	Monthly[b]	G	NS (418.1)	NL	100
COD	mg/l	Monthly[b]	C	NS (410.4)	NL	NL
BOD_5	mg/l	Monthly[b]	C	NS (405.1)	NL	NL
TSS	mg/l	Monthly[b]	C	NS (160.2)	NL	NL
Arsenic	mg/l	Monthly[b]	C	NS (206.2)	1	3
Cadmium	mg/l	Monthly[b]	C	NS (200.7)	0.26	0.69
Chromium	mg/l	Monthly[b]	C	NS (200.7)	0.12	0.23
Copper	mg/l	Monthly[b]	C	NS (200.8)	0.36	1.1
Cyanide	mg/l	Monthly[b]	G	NS (335.2)	0.65	1.2
Lead	mg/l	Monthly[b]	C	NS (200.8)	0.4	0.6
Mercury	mg/l	Monthly[b]	C	NS (245.2)	0.11	0.048
Nickel	mg/l	Monthly[b]	C	NS (200.7)	0.17	0.36
Silver	mg/l	Monthly[b]	C	NS (272.2)	0.24	0.43
Zinc	mg/l	Monthly[b]	C	NS (200.7)	0.66	2.2
TVOS[c]	lb/hr	Monthly[b]	G	NA	NL	0.1/0.5
Total Toxic Organics[d,e]	mg/l	Monthly[b]	G/C	NA	NL	2.13

Notes:

a - NS - not specified in Permit; method proposed in parentheses.

b - Weekly for first month, Monthly thereafter.

c - see Table 2-2a for parameter list and further definition of limits.

d - see Table 2-2b for parameter list; limit is sum of individual parameters present at >10 ug/l.

e - Pesticides and PCBs shall be below Minimum Detection Limits (see Table 2-2c).

f - flow is not limited; however, it shall not exceed 40,000 gpd monthly average or daily maximum.

NL - not limited NA - not applicable

F - flowmeter G - grab sample C - composite sample

TABLE 2-2a
KIN-BUC LANDFILL PILOT STUDY WORK PLAN
MCUA Toxic Volatile Organic Substances (TVOS)

TVOS Parameter
Benzene
Carbon Tetrachloride
Dioxane
Ethylenimine
Ethylene Dibromide
Ethylene Dichloride (1,2-Dichloroethene)
1,1,2,2-Tetrachloroethane
Tetrachloroethylene
1,1,2-Trichloroethane
Trichloroethylene

MCUA Limits: 0.1 lb/hr for each substance;
0.5 lb/hr for sum of all substances
(At 20,000 gpd, equivalent to 14,380 ug/l
for each substance, 71,900 ug/l for sum
of all substances.)

TABLE 2-2b
KIN-BUC LANDFILL PILOT STUDY WORK PLAN
MCUA Total Toxic Organics (TTO) Parameters

Base Neutrals	Base Neutrals (cont'd)	Pesticides/PCBs	Volatile Organics (cont'd)
Acenaphthene	1,2-dipenylhydrazine	Aldrin	Bis(chloromethyl)ether
Acenaphthylene	Fluroranthene	alpha-BHC	Bromoform
Anthracene	Fluorene	beta-BHC	Carbon tetrachloride
Benzidene	Hexachlorobenzene	gamma-BHC	Chlorobenzene
Benzo(a)anthracene	Hexachlorobutadiene	delta-BHC	Chlorodibromomethane
Benzo(a)pyrene	Hexachlorocyclopentadiene	Chlordane	Chloroethane
Benzo(g,h,i)perylene	Hexachloroethane	4,4-DDD	2-chloroethyl vinyl ether
Benzo(k)fluoranthene	Indeno(1,2,3-cd)pyrene	4,4-DDE	Chloroform
3,4-benzofluoranthene	Isophorone	4,4-DDT	Dichlorobromomethane
Bis(2-chloroethoxy)methane	Naphthalene	Dieldrin	Dichlorodifluoromethane
Bis(2-chloroethoxy)ether	Nitrobenzene	alpha-endosulfan	1,1-dichloroethane
Bis(2-chloroisopropyl)ether	N-nitroso-di-n-propylamine	beta-endosulfan	1,2-dichloroethane
Bis(2-ethylhexyl)phthalate	N-nitrosodimethylamine	Endosulfan sulfate	1,1-dichloroethylene
4-bromophenyl phenyl ether	N-nitrosodiphenylamine	Endrin	1,2-dichloropropane
Butyl benzyl phthalate	Phenanthrene	Endrin aldehyde	1,3-dichloropropylene
2-chloronaphthalene	Pyrene	Heptachlor	Ethylbenzene
4-chlorophenyl phenyl ether	3,3-dichlorobenzidine	Heptachlor epoxide	Methyl bromide
Chrysene	2,3,7,8-tetrachloro-dibenzo-p-dioxin	Toxaphene	Methyl chloride
Di-n-butyl phthalate	**Acid Extractables**	PCB-1016	Methylene chloride
Di-n-octyl phthalate	2-chlorophenol	PCB-1221	1,1,2,2-tetrachloroethane
Dibenzo(a,h)anthracene	2,4-dichlorophenol	PCB-1232	Tetrachloroethylene
1,2-dichlorbenzene	2,4-dimethylphenol	PCB-1242	Toluene
1,3-dichlorobenzene	4,6-dinitro-o-cresol	PCB-1248	1,2-trans-dichloroethylene
1,4-dichlorobenzene	2,4-dinitrophenol	PCB-1254	1,1,1-trichloroethane
1,2,4-trichlorobenzene	2-nitrophenol	PCB-1260	1,1,2-trichloroethane
Diethyl phthalate	4-nitrophenol	**Volatile Organics**	Trichloroethylene
Dimethyl phthalate	p-chloro-m-cresol	Acrolein	Trichlorofluoromethane
2,4-dinitrotoluene	Pentachlorophenol	Acrylonitrile	Vinyl chloride
2,6-dinitrotoluene	Phenol	Benzene	Xylene
	2,4,6-trichlorophenol		

Note: 1) The sum of all TTOs >10 ug/l must be less than 2.13 mg/l.

2) Individual Pesticides and PCBs must be below Minimum Detection Limits (see Table 2-2c).

TABLE 2-2c
KIN-BUC LANDFILL PILOT STUDY WORK PLAN
MCUA Pesticide and PCB Limits

Compound	MCUA Effluent Limit (ug/l)[a]
Aldrin	0.004
alpha-BHC	0.003
beta-BHC	0.006
gamma-BHC	0.004
delta-BHC	0.009
Chlordane	0.014
4,4-DDD	0.011
4,4-DDE	0.004
4,4-DDT	0.012
Dieldrin	0.002
alpha-endosulfan	0.014
beta-endosulfan	0.004
Endosulfan sulfate	0.066
Endrin	0.006
Endrin aldehyde	0.023
Heptachlor	0.003
Heptachlor epoxide	0.083
Toxaphene	0.24
PCB-1016	ND
PCB-1021	ND
PCB-1232	ND
PCB-1242	0.065
PCB-1248	ND
PCB-1254	ND
PCB-1260	ND

a - Minimum Detection Limits from 40CFR136 Appendix A, Method 608 Table 1 (ND = not developed)

TABLE 3-1
KIN-BUC LANDFILL PILOT STUDY WORK PLAN
Estimated Treatment Requirements - Discharge to Surface Water

Parameter	Units	Influent Quality[a]	Effluent Requirement[b]		Percent Removal Required[c]
			Monthly Avg.	Daily Max.	
NJPDES Parameters:					
pH Range	S.U.	6.43-7.55	NA	6.0-9.0	NA
Petroleum Hydrocarbons[d]	mg/l	1	10	15	0
Chemical Oxygen Demand	mg/l	617	NL	NL[h]	NA
5-Day BOD	mg/l	50	56	220	0
Total Suspended Solids	mg/l	107	30	45[i]	72.0
Ammonia[e]	mg/l	43	4.9	10	88.6
Dissolved Oxygen	mg/l	0		4.0-5.0[h]	NA
Benzene	ug/l	709	57	134	92.0
Chlorobenzene	ug/l	1,073	142	380	86.8
1,1-Dichloroethane[f]	ug/l	33	22	59	32.8
Ethylbenzene	ug/l	245	142	380	42.1
Tetrachloroethylene[g]	ug/l	32	52	164	0
Toluene	ug/l	1,664	28	74	98.3
1,2-trans-Dichloroethylene[g]	ug/l	29	25	60	14.1
Trichloroethylene[g]	ug/l	33	26	69	20.6
Vinyl Chloride[f]	ug/l	178.2	52.8	106	70.4
Acenaphthylene[g]	ug/l	2.04	1.72	3.43	15.5
Benzo(a)Anthracene[d]	ug/l	4.09	1.72	3.43	58.0
Benzo(a)Pyrene[d]	ug/l	3.00	1.72	3.43	42.7
Benzo(ghi)Perylene[g]	ug/l	1.67	1.72	3.43	0
Benzo(k)Fluoranthene[d]	ug/l	4.36	1.72	3.43	60.6
Ideno(1,2,3-cd)Pyrene[d]	ug/l	1.63	1.72	3.43	0
Phenanthrene	ug/l	2.2	NL	3.5/5.4[j]	0
Aldrin[g]	ug/l	0.052	0.0875	0.176	0
4,4-DDT[g]	ug/l	0.100	0.38	0.765	0
PCB-1242[g]	ug/l	0.309	NL	0.313	0

TABLE 3-1
KIN-BUC LANDFILL PILOT STUDY WORK PLAN
Estimated Treatment Requirements - Discharge to Surface Water

Parameter	Units	Influent Quality[a]	Effluent Requirement[b]		Percent Removal Required[c]
			Monthly Avg.	Daily Max.	
PCB-1248[g]	ug/l	0.309	NL	0.313	0
PCB-1254[g]	ug/l	0.309	NL	0.313	0
PCB-1260[g]	ug/l	0.309	NL	0.313	0
Arsenic, total	ug/l	63.5	85.8	172	0
Cadmium, total	ug/l	30.6	48.2	112	0
Chromium, total	ug/l	30	198	396	0
Copper, total	ug/l	84	NL	10	88.1
Lead, total	ug/l	19	NL	10	48.2
Nickel, total	ug/l	191	924	1,850	0
Zinc, total	ug/l	201	1,170	2,350	0
Cyanide[g]	ug/l	10.0	13.2	26.4	0
Aluminum, total	ug/l	201	9,240	18,500	0
Iron, total	ug/l	45,473	532,000	1,070,000	0
Acute Toxicity	%effluent	NA	>50%[k]	NA	NA

Notes:

a - flow-weighted average, using 1,500 gpd leachate/15,000 gpd groundwater and maximum concentrations from characterization studies.

b - existing NJPDES Permit Equivalency effluent limits (including 10/18/00 revisons for BOD and ammonia).

c - based on influent value and monthly average effluent limit (based on daily max. limit where no monthly average limit exists); based on 3.5 ug/l for Phenanthrene.

d - groundwater value in the weighted average was below detection limit (highest detection limit was used).

e - influent value based on metals removal effluent, not influent leachate/groundwater.

f - leachate value in the weighted average was below detection limit (highest detection limit was used).

g - both leachate and groundwater values in the weighted average were below detection limits (highest dectection limit was used).

h - not limited, as long as effluent D.O. is an instantaneous minimum of 4 mg/l, and 5 mg/l average for a 24-hour period;

i - 7-day average.

j - shall meet the Reporting Discharge Level of 5.4 ug/l Daily Max.

k - die-off of 50% of the test specie must not occur with less than 50% effluent in the test water.

NA - not applicable NL - not limited

TABLE 3-2
KIN-BUC LANDFILL PILOT STUDY WORK PLAN
Estimated Treatment Requirements - Discharge to MCUA

Parameter	Units	Influent Quality	Effluent Limits		Percent Removal Required
			Monthly Avg.	Daily Max.	
pH Range	S.U.	6.43-7.55	NA	5.0-10.0	N/A
Petroleum Hydrocarbons[a]	mg/l	1	NL	100	0
COD[a]	mg/l	617	NL	NL	0
BOD_5[a]	mg/l	50	NL	NL	0
TSS[a]	mg/l	107	NL	NL	0
Arsenic[a]	mg/l	0.0635	1	3	0
Cadmium[a]	mg/l	0.0306	0.26	0.69	0
Chromium[a]	mg/l	0.03	0.12	0.23	0
Copper[a]	mg/l	0.084	0.36	1.1	0
Cyanide[a]	mg/l	0.01	0.65	1.2	0
Lead[a]	mg/l	0.019	0.4	0.6	0
Mercury[b]	mg/l	0.002	0.11	0.048	0
Nickel[a]	mg/l	0.191	0.17	0.36	11.0
Silver[b]	mg/l	0.033	0.24	0.43	0
Zinc[a]	mg/l	0.201	0.66	2.2	0
TVOS[c]:					
Benzene[d]	lb/hr	0.005	NL	0.1	0
Dioxane	lb/hr	no data	NL	0.1	unknown
Ethylenimine	lb/hr	no data	NL	0.1	unknown
Ethylene Dibromide	lb/hr	no data	NL	0.1	unknown
1,2-Dichoroethene	lb/hr	0.0002	NL	0.1	0
Tetrachloroethylene[d]	lb/hr	0.0002	NL	0.1	0
Trichloroethylene[d]	lb/hr	0.0002	NL	0.1	0
Total Toxic Organics[e]:	mg/l	4.155	NL	2.13	48.7
Benzo(a)anthracene[a]	mg/l	0.004			
Naphthalene[a]	mg/l	0.011			
2,4-dimethylphenol[a]	mg/l	0.03			
4,6-dinitro-o-cresol	mg/l	no data			
p-chloro-m-cresol	mg/l	no data			
Benzene[a]	mg/l	0.709			
Bis(chloromethyl)ether	mg/l	no data			
Chlorobenzene[a]	mg/l	1.073			
Chloroethane[a]	mg/l	0.011			
1,1-dichloroethane[a]	mg/l	0.033			
Ethylbenzene[a]	mg/l	0.245			
Tetrachloroethylene[a]	mg/l	0.032			
Toluene[a]	mg/l	1.664			
1,2-trans-dichloroethylene[a]	mg/l	0.029			
Trichloroethylene[a]	mg/l	0.033			
Vinyl chloride[a]	mg/l	0.178			

TABLE 3-2
KIN-BUC LANDFILL PILOT STUDY WORK PLAN
Estimated Treatment Requirements - Discharge to MCUA

Parameter	Units	Influent Quality	Effluent Limits		Percent Removal Required
			Monthly Avg.	Daily Max.	
Xylene[a]	mg/l	0.103			
Pesticides and PCBS:					
Aldrin[a]	ug/l	0.052	NL	0.004	92.3
alpha-BHC	ug/l	no data	NL	0.003	unknown
beta-BHC	ug/l	no data	NL	0.006	unknown
gamma-BHC	ug/l	no data	NL	0.004	unknown
delta-BHC	ug/l	no data	NL	0.009	unknown
Chlordane	ug/l	no data	NL	0.014	unknown
4,4-DDD	ug/l	no data	NL	0.011	unknown
4,4-DDE	ug/l	no data	NL	0.004	unknown
4,4-DDT[a]	ug/l	0.100	NL	0.012	88.0
Dieldrin	ug/l	no data	NL	0.002	unknown
alpha-endosulfan	ug/l	no data	NL	0.014	unknown
beta-endosulfan	ug/l	no data	NL	0.004	unknown
Endosulfan sulfate	ug/l	no data	NL	0.066	unknown
Endrin	ug/l	no data	NL	0.006	unknown
Endrin aldehyde	ug/l	no data	NL	0.023	unknown
Heptachlor	ug/l	no data	NL	0.003	unknown
Heptachlor epoxide	ug/l	no data	NL	0.083	unknown
Toxaphene	ug/l	no data	NL	0.24	unknown
PCB-1242[a]	ug/l	0.309	NL	0.065	79.0

Notes:

a - influent quality based on flow-weighted average, using 1,500 gpd leachate and 15,000 gpd groundwater and maximum concentrations from recent leachate and groundwater characterization.

b - no recent influent data; used 1993 design data.

c - see Table 3-2a for list of TVOS to be included in pilot monitoring.

d - lb/hr influent calculated at 20,000 gpd flow and concnetration developed as per Note a.

e - see Table 3-2b for list of TTOs to be included in pilot monitoring; individual substances listed are historically in the influent at >10 ug/l.

NA - not applicable

NL - not limited

TABLE 3-2a
KIN-BUC LANDFILL PILOT STUDY WORK PLAN
MCUA Toxic Volatile Organic Substances (TVOS) To Be Monitored

TVOS Parameter
Benzene[a]
Carbon Tetrachloride
Dioxane[b]
Ethylenimine[b]
Ethylene Dibromide[b]
Ethylene Dichloride (1,2-Dichloroethene)[a]
1,1,2,2-Tetrachloroethane
Tetrachloroethylene[a]
1,1,2-Trichloroethane
Trichloroethylene[a]

MCUA Limits: 0.1 lb/hr for each substance;
0.5 lb/hr for sum of all substances
(at 20,000 gpd: equivalent to 14,380 ug/l
for each substance, 71,900 ug/l for sum
of all substances)

Bold parameters should be included in pilot study monitoring

a - historically present in influent above detection limits.

b - no historical influent data; therefore, include in initial pilot monitoring.

TABLE 3-2b
KIN-BUC LANDFILL PILOT STUDY WORK PLAN
MCUA Total Toxic Organics (TTO) Parameters To Be Monitored

Base Neutrals	Base Neutrals (cont'd)	Pesticides/PCBs	Volatile Organics (cont'd)
Acenaphthene	1,2-dipenylhydrazine	**Aldrin**[e]	**Bis(chloromethyl)ether**[c]
Acenaphthylene	Fluroranthene	**alpha-BHC**[f]	Bromoform
Anthracene	Fluorene	**beta-BHC**[f]	Carbon tetrachloride
Benzidene	Hexachlorobenzene	**gamma-BHC**[f]	**Chlorobenzene**[a]
Benzo(a)anthracene[a]	Hexachlorobutadiene	**delta-BHC**[f]	Chlorodibromomethane
Benzo(a)pyrene[b]	Hexachlorocyclopentadiene	**Chlordane**[f]	**Chloroethane**[a]
Benzo(g,h,i)perylene	Hexachloroethane	**4,4-DDD**[f]	2-chloroethyl vinyl ether
Benzo(k)fluoranthene[b]	**Indeno(1,2,3-cd)pyrene**[b]	**4,4-DDE**[f]	**Chloroform**[b]
3,4-benzofluoranthene	Isophorone	**4,4-DDT**[e]	Dichlorobromomethane
Bis(2-chloroethoxy)methane	**Naphthalene**[a]	**Dieldrin**[f]	Dichlorodifluoromethane
Bis(2-chloroethoxy)ether	Nitrobenzene	**alpha-endosulfan**[f]	**1,1-dichloroethane**[a]
Bis(2-chloroisopropyl)ether	N-nitroso-di-n-propylamine	**beta-endosulfan**[f]	1,2-dichloroethane
Bis(2-ethylhexyl)phthalate[b]	N-nitrosodimethylamine	**Endosulfan sulfate**[f]	1,1-dichloroethylene
4-bromophenyl phenyl ether	**N-nitrosodiphenylamine**[b]	**Endrin**[f]	1,2-dichloropropane
Butyl benzyl phthalate	**Phenanthrene**[b]	**Endrin aldehyde**[f]	1,3-dichloropropylene
2-chloronaphthalene	Pyrene	**Heptachlor**[f]	**Ethylbenzene**[a]
4-chlorophenyl phenyl ether	3,3-dichlorobenzidine	**Heptachlor epoxide**[f]	Methyl bromide
Chrysene	2,3,7,8-tetrachloro-dibenzo-p-dioxin[d]	**Toxaphene**[f]	Methyl chloride
Di-n-butyl phthalate	**Acid Extractables**	PCB-1016	Methylene chloride
Di-n-octyl phthalate	2-chlorophenol	PCB-1221	1,1,2,2-tetrachloroethane
Dibenzo(a,h)anthracene	2,4-dichlorophenol	PCB-1232	**Tetrachloroethylene**[a]
1,2-dichlorbenzene	**2,4-dimethylphenol**[a]	**PCB-1242**[e]	**Toluene**[a]
1,3-dichlorobenzene	**4,6-dinitro-o-cresol**[c]	PCB-1248	**1,2-trans-dichloroethylene**[a]
1,4-dichlorobenzene[b]	2,4-dinitrophenol	PCB-1254	1,1,1-trichloroethane
1,2,4-trichlorobenzene	2-nitrophenol	PCB-1260	1,1,2-trichloroethane
Diethyl phthalate	4-nitrophenol	**Volatile Organics**	**Trichloroethylene**[a]
Dimethyl phthalate	**p-chloro-m-cresol**[c]	Acrolein	Trichlorofluoromethane
2,4-dinitrotoluene	Pentachlorophenol	Acrylonitrile	**Vinyl chloride**[a]
2,6-dinitrotoluene	Phenol	**Benzene**[a]	**Xylene**[a]
	2,4,6-trichlorophenol		

TABLE 3-2b
KIN-BUC LANDFILL PILOT STUDY WORK PLAN
MCUA Total Toxic Organics (TTO) Parameters To Be Monitored

Notes:

Bold parameters should be included in pilot study monitoring

a - historically present in influent above 10 ug/l; therefore should be included in pilot monitoring.

b - historically present above detection limits but below 10 ug/l; therefore should be included in initial pilot monitoring.

c - no historical influent data exists; therefore should be included in initial pilot monitoring.

d - no historical influent data; not recommended for inclusion in pilot monitoring.

e - historically present in influent above specific limits in Table 2-2c; therefore, should be included in pilot monitoring.

f - no data; therefore, include in inital pilot monitoring.

TABLE 3-3
KIN-BUC LANDFILL PILOT STUDY WORK PLAN
Stripper and GAC Unit Treatment Performance Requirements

Flow: 20,000 gpd (14 gpm)

I. Stripper

Parameter	Influent (ug/l)	Effluent[a] (ug/l)	Percent Removal	lb/hour Stripped
Benzene	710	5	99.3	0.0049
Chlorobenzene	1,075	5	99.5	0.0074
1,1-Dichloroethane	35	5	85.7	0.0002
Ethylbenzene	250	5	98.0	0.0017
Tetrachloroethylene	35	5	85.7	0.0002
Toluene	1,665	5	99.7	0.0115
1,2-trans-Dichloroethylene	30	5	83.3	0.0002
Trichloroethylene	35	5	85.7	0.0002
Vinyl Chloride	180	5	97.2	0.0012
Xylene	105	5	95.2	0.0007

a - Lower than effluent limits but specified to limit GAC consumption

II. GAC Unit

Parameter	Influent[a] (ug/l)	Effluent[b] (ug/l)	Percent Removal
Acenaphthylene	2.04	1.70	16.7
Benzo(a)anthracene	4.10	1.70	58.5
Benzo(a)pyrene	3.00	1.70	43.3
Benzo(k)fluoranthene	4.40	1.70	61.4
PCB-1242	0.309	0.065	79.0
PCB-1248	0.309	0.065	79.0
PCB-1254	0.309	0.065	79.0
PCB-1260	0.309	0.065	79.0

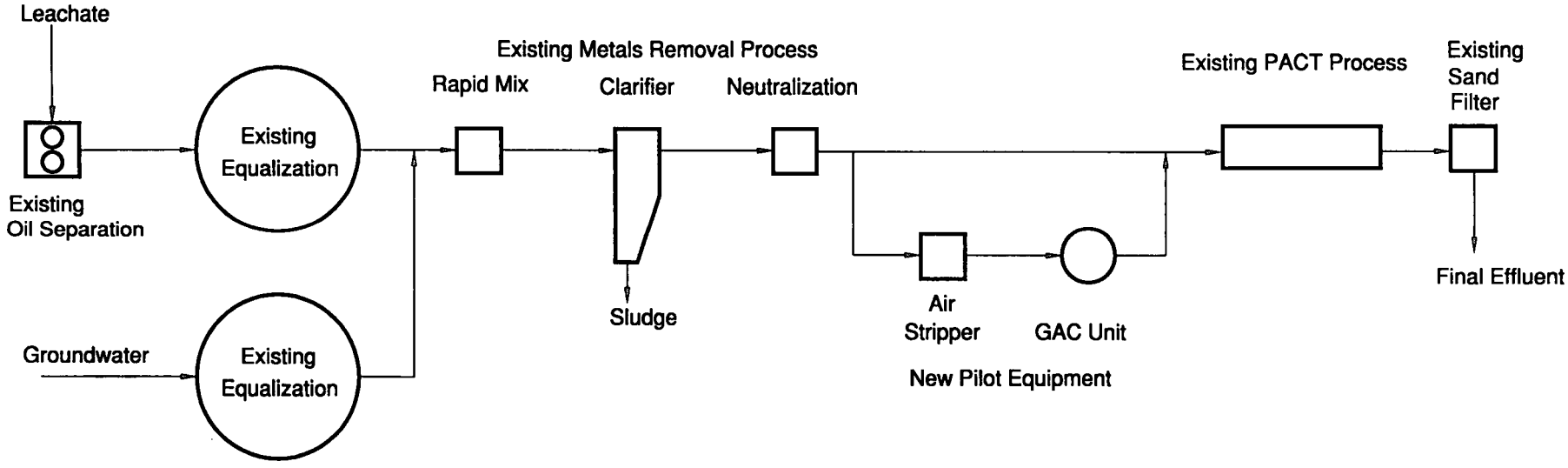
a - PCB influent values are actually <0.309 (detection limit used)

b - discharge to surface water limits used for PAHs (first four parameters)

FIGURES

ENE-MTOWN2/DATA N:\DWG\796201\TSK4_SEC\Fig3-1.DWG Fri, 12/Jan/01 1:00 pm mohara

IMAGE	X-REF	OFFICE	DRAWN BY		CHECKED BY		APPROVED BY		DRAWING NUMBER	FIG3-1
----	----	NJM	M.O'Hara	1/12/01	M.O'Hara	1/12/01	M.O'Hara	1/12/01		



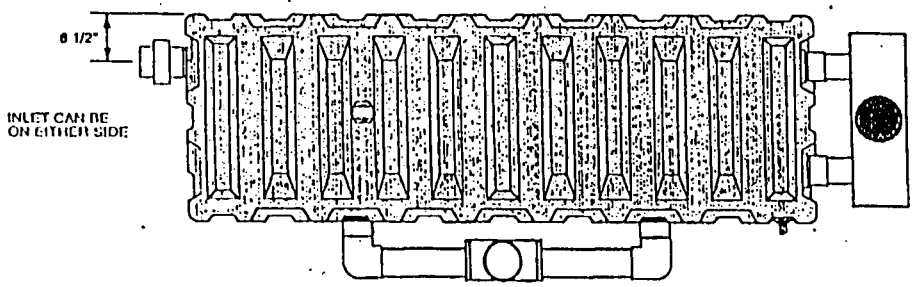
SCA SERVICES, INC.
KIN-BUC LANDFILL
Edison, New Jersey

MWO Environmental Engineering & Consulting, P.C.

FIGURE 3-1
Pilot Study Work Plan
Pilot Equipment Location
in Existing Treatment Process

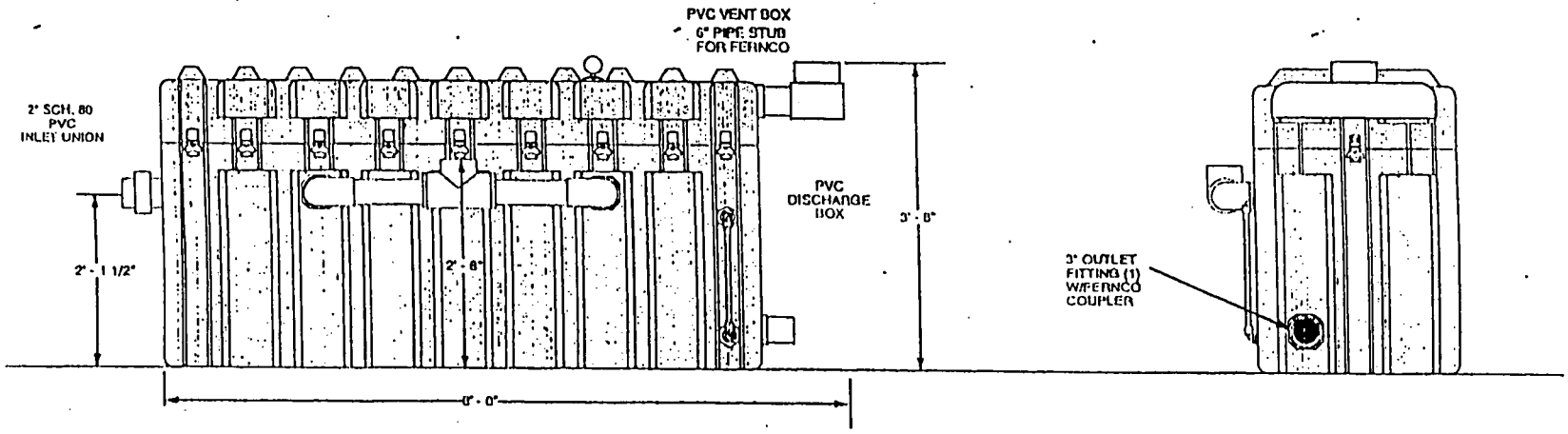
ENE-MTOWN2/DATA N:\DWG\796201\TSK4_SEC\Fig3-2.DWG Fri, 12/Jan/01 1:00 pm mohara

IMAGE	X-REF	OFFICE	DRAWN BY		CHECKED BY		APPROVED BY		DRAWING NUMBER	FIG3-2
----	----	NJM	M.O'Hara	1/12/01	M.O'Hara	1/12/01	M.O'Hara	1/12/01		



6-Stage DEEP BUBBLE AERATION SYSTEM

LOWRY AERATION SYSTEMS
350 South Street
Blue Hill, ME 04614
800-434-9080
207-374-3503 FAX



SCALE: 1/2" = 1'

IT CORPORATION

SCA SERVICES, INC.
KIN-BUC LANDFILL
Edison, New Jersey

MWO Environmental Engineering & Consulting, P.C.

FIGURE 3-2
Pilot Study Work Plan
Diffused Bubble Air Stripper

APPENDICES

APPENDIX A - Edison Leachate Quantity and Quality

Fax From

Pitone 845 7742355

Converse Consultants
3 Century Drive
Parsippany, NJ 07054
973-605-5200
Return Message to our Fax. 973-605-8145

From: Brian D. Gillen, P.E. To Company: MWO

Date: 11.21.00 Time: 5:00 Att: MIKE O'HARA

Fax No.: 845 774 2690

Hard Copy to Follow ☐

Company	Name	Fax No.

Total No. of pages Including Transmittal 9

cc Hann Zanetti, Jr. P.E.

Message:

ATTACHED please find a copy of my letter to US Filter (KM Buc) of last year. It contains our BEST ESTIMATES of future leachate flows & characterization. Converse estimates future leachate characterization as follows

BOD_5	50 mg/l
TSS	250 mg/l
TS	2600 mg/l
COD	520 mg/l

ANY QUESTIONS, PLEASE call

"An Equal Opportunity Employer"

faxcon8.qxd, 1-21-98

Converse Consultants
Over 50 Years of Dedication in Geotechnical Engineering and Environmental Sciences

November 11, 1999

Mr. Glenn Grieb, Plant Operations Manager
Operating Services
Kin Buc Landfill
383 Meadow Road
Edison, NJ 08817

Re: Inquiries Regarding Discharge of Leachate
(99-37304-01)

Dear Mr. Grieb:

The Township of Edison is currently completing closure of the Edison Landfill. As part of the closure, one of the leachate pretreatment options under consideration is discharge of leachate into the Kin Buc Leachate Treatment Plant. The preliminary plans include discharge of leachate from a pumping station at the southwest corner of the site near the landfill entrance to the Kin Buc equalization tank per the alignment shown on attachment A. The leachate flow and characterization follows:

- Daily Flow — 25000 to 30000 gpd decreasing over time
- Pump Discharge — 100 gpm 15 minutes every hour
- Leachate Characterization — See Attachment

There are no constituents in the leachate characterization shown on the attached sheets that, in our opinion, will adversely effect the operation of the plant or your ability to achieve discharge standards. Please provide us with sewer discharge fees or any other information that will assist us in our evaluation of leachate discharge alternatives. A tentative date for completion of the system would be April 2002.

3 Century Drive, P.O. Box 265, Parsippany, New Jersey 07054-0265
Telephone (973) 605-5200 ♦ Facsimile (973) 605-8145 ♦ e-mail: convers@mail.idt.net

If you require any additional information, please do not hesitate to contact me.

Yours truly,

CONVERSE CONSULTANTS

Brian D. Gillen, P.E.
Principal Engineer

BDG/rmd

cc: H. Zanetti, Jr., P.E.
A. Bergman, Esq.

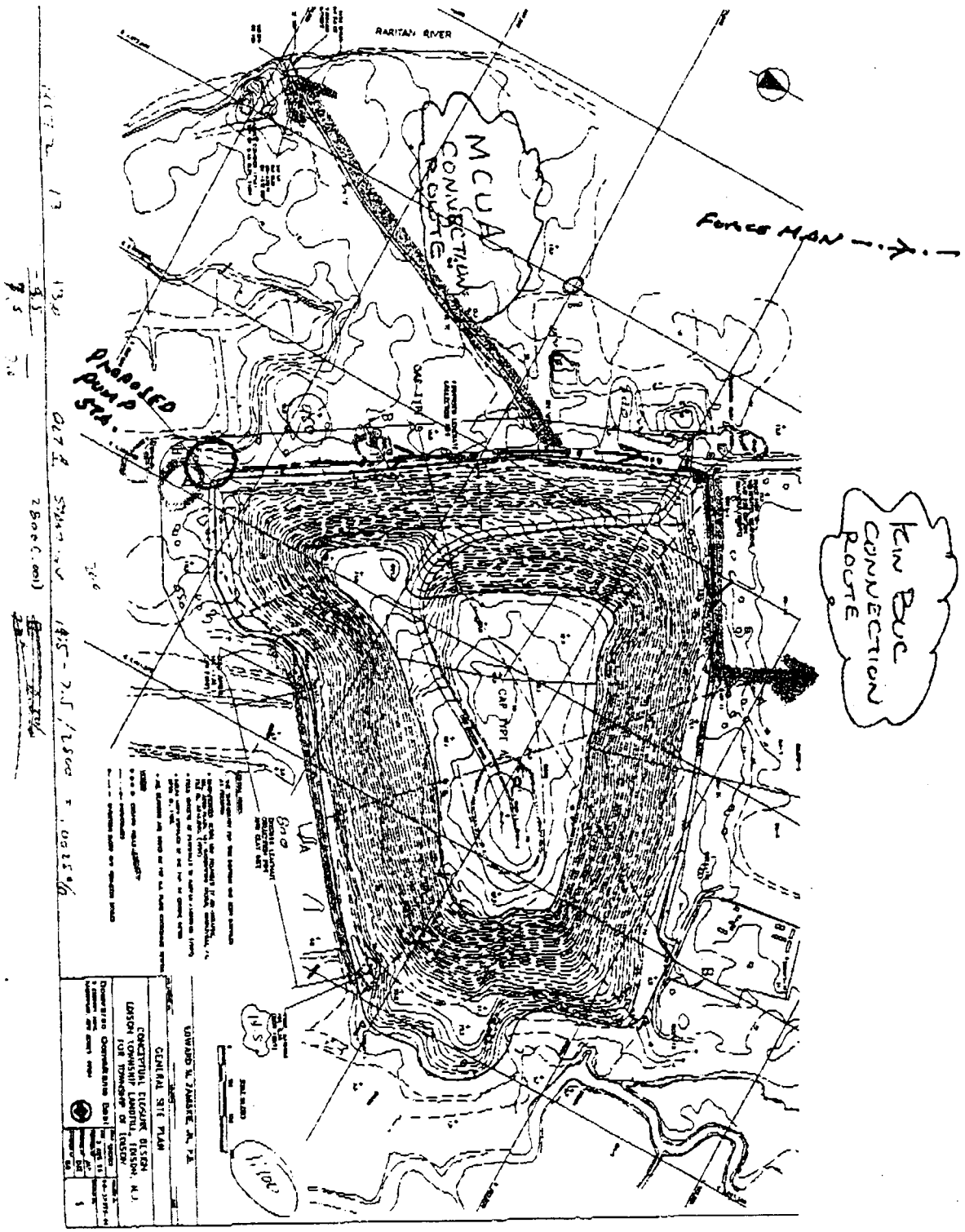

RARITAN RIVER
MCUA CONNECTION ROUTE
FORCE MAIN
PROPOSED PUMP STA.
KIN BUC CONNECTION ROUTE
CONCEPTUAL SITE PLAN

TABLE 1

SUMMARY OF GROUNDWATER QUALITY DATA

FOR EDISON LANDFILL

Analyses	Units	MW-1	MW-2	MW-3	MW-4	MW-5
BOD, 5 day	mg/l	17	30	89	100	7
Chloride, D	mg/l	82	400	600	1500	300
COD, D	mg/l	110	300	500	900	84
Copper, D	ug/l	<10	<10	<10	<10	<10
Iron, D	ug/l	16000	390	4900	3600	1300
Lead, D	ug/l	<40	<40	<40	<40	<40
MBAS	mg/l	0.5	0.6	0.1	0.3	0.2
Nitrogen(ammonia)D	mg/l	100	200	400	700	51
Nitrogen(nitrate)D	mg/l	2	2	2	3	1
pH	S.U.	6.64	7.21	7.30	7.51	6.97
Phenols	ug/l	50	50	<50	200	50
Sodium, D	mg/l	79	330	700	1700	200
Sulfate, D	mg/l	4	15	20	21	84
TDS	ppm	700	1700	3000	6300	1200
TOC	ppm	25.5	75.5	161	348	34.5
Zinc, D	ug/l	<20	44	60	74	49

BOD	Biological Oxygen Demand	D	Dissolved
COD	Chemical Oxygen Demand	mg/l	milligram per liter
TDS	Total Dissolved Solids	ug/l	microgram per liter
TOC	Total Organic Carbon	S.U.	Standard Units
MBAS	Methylene Blue Active Substances		

Note: Sampling Date 10/13/89

TABLE 2 (continued)

EDISON MUNICIPAL LANDFILL
Analytical Sampling Summary
Post-Rain Leachate Samples September 20, 1991
Page 4 of 4

	PRL-1	PRL-2	PRL-FB	USEPA MAX. LEVEL
Herbicides/Pesticides (ppb)				
Heptachlor Epoxide	ND	0.13	0.10	**
Heptachlor	ND	ND	ND	0.001
Aldrin	ND	0.04 J	ND	**
Endosulfan 1	ND	0.09	ND	**
Dieldrin	ND	ND	ND	**
Endosulfan II	0.03 J	ND	ND	**
DDD	0.84	0.38	ND	**
4,4'-DDT	ND	0.02 J	ND	**
Endrin Ketone	ND	ND	ND	**
G-Chlordane	ND	0.08 J	ND	**
Lindane	0.64	ND	ND	0.06
D-BHC	0.02 J	ND	ND	**
DDE	0.03 J	ND	ND	**
Endrin Aldehyde	0.04 J	ND	ND	**
Total Herbicides/Pesticides (ppb)	1.48	0.60	0.10	**
Priority Pollutant Metals (ppm)				
Antimony	ND	ND	ND	**
Arsenic	0.03	0.03	ND	5.0
Beryllium	ND	ND	ND	**
Cadmium	ND	ND	ND	1.0
Chromium	0.04	0.07	ND	5.0
Copper	0.09	0.05	ND	**
Lead	ND	ND	ND	5.0
Mercury	ND	ND	ND	0.2
Nickel	0.13	0.14	ND	**
Selenium	ND	ND	ND	1.0
Silver	ND	ND	ND	5.0
Thallium	ND	ND	ND	**
Zinc	0.16	0.07	0.08	**
Polychlorinated Biphenyls (ppm)	ND	ND	ND	**
Total Cyanide (ppm)	0.02	ND	ND	**
Phenols (ppm)	0.12	0.23	0.02	**

PRL Post-Rain Leachate
ND Not Detected
-- Not analyzed
** No level available
J Compound detected below method detection limits
FB Field Blank
TB Trip (Travel) Blank

All compounds reported in parts per million (ppm), unless otherwise noted.

TABLE 2 (continued)

EDISON MUNICIPAL LANDFILL
Analytical Sampling Summary
Post-Rain Leachate Sampled September 20, 1991
Page 3 of 4

	PRL-1	PRL-1A	PRL-2	PRL-FB	PRL-TB	MAX. LEVEL
Target Volatile Organics (ppm)						
Acetone	0.021	0.026	ND	ND	ND	**
Benzene	ND	ND	0.001 J	ND	ND	0.07
Bromodichloromethane	ND	ND	0.001 J	ND	ND	**
2-Butanone	ND	0.004	ND	ND	ND	**
2-Hexanone	ND	ND	0.002 J	ND	ND	**
Chloroform	ND	ND	0.004 J	ND	0.002 J	0.07
Ethylbenzene	0.001 J	ND	0.002 J	ND	ND	**
Methylene Chloride	ND	0.001 B	ND	0.004 J	0.003 J	8.6
m,p-Xylene	0.003 J	0.003 J	0.003 J	ND	ND	**
O-xylene	0.002 J	0.002 J	0.003 J	ND	ND	**
Total Target Compounds (ppm)	0.021	0.030	0.000	0.000	0.000	**
Tentatively Identified Compounds	0.000	0.000	0.068	0.000	0.000	**
Total Volatile Organics (ppm)	0.021	0.030	0.068	0.000	0.000	**
Target Base Neutrals (ppm)						
bis(2-Chloroisopropyl)ether	ND	--	ND	ND	--	**
Isophorone	ND	--	ND	ND	--	**
Diethylphthalate	0.002 J	--	ND	ND	--	**
bis(2-Ethylhexyl)Phthalate	0.009 J	--	0.010 J	ND	--	**
3-Nitroaniline	0.004 J	--	ND	ND	--	**
Di-n-Butylphthalate	0.001 J	--	0.002 J	ND	--	**
4-Chlorophenyl-phenylether	ND	--	0.010 J	ND	--	**
Fluoranthene	ND	--	0.004 J	ND	--	**
Pyrene	ND	--	0.002 J	ND	--	**
Total Target Compounds (ppm)	0.000	--	0.000	ND	--	**
Tentatively Identified Compounds	1.687	--	4.169	ND	--	**
Total Base Neutrals (ppm)	1.687	--	4.169	ND	--	**

PRL Post-Rain Leachate
ND Not Detected
-- Not Analyzed
** No USEPA level available
J Compound detected below method detection limits
B Compound also detected in laboratory quality control blank
FB Field Blank
TB Trip (Travel) Blank

All compounds reported in parts per million (ppm)

TABLE 2 (continued)

EDISON MUNICIPAL LANDFILL
Analytical Sampling Summary
Pre-Rain Leachate Sampled August 8, 1991
Page 2 of 4

	L-1	L-2	FB-1	TB-1	USEPA MAX. LEVELS
Herbicides/Pesticides (ppb)					
Heptachlor Epoxide	ND	ND	ND	--	**
Heptachlor	0.23	ND	ND	--	0.001
Aldrin	ND	0.09	ND	--	**
Endosulfan I	0.08	ND	ND	--	**
Dieldrin	ND	0.02 J	ND	--	**
Endosulfan II	0.06 J	0.06 J	ND	--	**
DDD	1.27	1.06	ND	--	**
4,4'-DDT	0.14	ND	ND	--	**
Endrin Ketone	0.03 J	ND	ND	--	**
G-Chlordane	0.12 J	0.09 J	ND	--	**
Lindane	ND	ND	ND	--	0.06
D-BHC	ND	ND	ND	--	**
DDE	ND	ND	ND	--	**
Endrin Aldehyde	ND	ND	ND	--	**
Total Herbicides/Pesticides (ppb)	1.72	1.15	ND	--	**
Priority Pollutant Metals (ppm)					
Antimony	ND	ND	ND	--	**
Arsenic	ND	0.04	ND	--	5.0
Beryllium	ND	ND	ND	--	**
Cadmium	ND	ND	ND	--	1.0
Chromium	ND	ND	0.02	--	5.0
Copper	0.04	0.16	ND	--	**
Lead	ND	ND	ND	--	5.0
Mercury	ND	ND	ND	--	0.2
Nickel	0.14	0.24	ND	--	**
Selenium	ND	ND	ND	--	1.0
Silver	ND	ND	ND	--	5.0
Thallium	ND	ND	ND	--	**
Zinc	0.20	0.21	ND	--	**
Polychlorinated Biphenyls (ppm)	ND	ND	ND	--	**
Total Cyanide (ppm)	ND	ND	ND	--	**
Phenols (ppm)	0.081	0.500	<0.010	--	**

ND Not Detected
-- Not analyzed
** No level available
J Compound detected below method detection limits
FB Field Blank
TB Trip (Travel) Blank
All compounds reported in parts per million (ppm), unless otherwise noted.

TABLE 2

EDISON MUNICIPAL LANDFILL
Analytical Sampling Summary
Pre-Rain Leachate Sampled August 8, 1991
Page 1 of 4

	L-1	L-2	FB-1	TB-1	USEPA MAX. LEVELS
Target Volatile Organics (ppm)					
Acetone	0.032	0.023	ND	ND	**
Benzene	ND	0.002 J	ND	ND	0.07
Bromodichloromethane	ND	ND	ND	ND	**
Chloroform	ND	ND	0.003 J	ND	0.07
Ethylbenzene	0.002 J	ND	ND	ND	**
Methylene Chloride	0.009	0.011	0.010 B	ND	8.6
m,p-Xylene	0.015	0.001 J	ND	ND	**
o-Xylene	0.006	ND	ND	ND	**
2-Butanone	ND	ND	ND	ND	**
2-Hexanone	ND	ND	ND	ND	**
Total Target Compounds (ppm)	0.062	0.034	0.000	0.000	**
Tentatively Identified Compounds	0.055	0.033	0.000	--	**
Total Volatile Organics (ppm)	0.117	0.067	0.000	0.000	**
Target Base Neutrals (ppm)					
bis(2-Chloroisopropyl)ether	0.003 J	0.002 J	ND	--	**
Isophorone	ND	0.005 J	ND	--	**
Diethylphthalate	0.001 J	ND	ND	--	**
bis(2-Ethylhexyl)Phthalate	0.011 B	0.007 B	0.002 B	--	**
3-Nitroanfline	ND	ND	ND	--	**
Di-n-Butylphthalate	ND	ND	ND	--	**
4-Chlorophenyl-phenylether	ND	ND	ND	--	**
Fluoranthene	ND	ND	ND	--	**
Pyrene	ND	ND	ND	--	**
Total Target Compounds (ppm)	0.000	0.000	0.000	--	**
Tentatively Identified Compounds	0.953	4.302	0.180	--	**
Total Base Neutrals (ppm)	0.953	4.302	0.180	--	**

ND Not Detected
-- Not Analyzed
** No levels available
J Compound detected below method detection limits
B Compound also detected in laboratory quality control blank
FB Field Blank
TB Trip (Travel) Blanks

All compounds reported in parts per million (ppm)